

Coding for Cookies

Brought to you by FRC 4607, C.I.S

Table of Contents

INTROS

- B-1: Cover Page
- B-2: Table of Contents
- B-3: Initiative Founding
- B-4: Initiative Description
- B-4: The Goal
- B-4: About FRC 4607, C.I.S

GIRL SCOUT BADGE REQUIREMENTS

- B-5&6: Daisy Badge
- B-7: Brownie Badge
- B-8: Junior Badge
- B-9&10: Cadette Badge
- B-11&12: Senior Badge
- B-13&14: Ambassador Badge

IMPLEMENTING THE INITIATIVE

- B-15: Points to Cover
- B-16&17: Portable Robotics Kit
- B-18&19: Necessities
- B-20: Research
- B-21: Where to Begin
- B-22: Works Cited

Initiative Founding



The Introductory Session

On April 27th, 2022, FRC, 4607 C.I.S worked with Girl Scout Troop #333 out of our shop in Becker, MN, while introducing them to STEM concepts and providing hands-on education. Our team members taught this group of young girls about programming FLL robots, driving an FTC robot, and operating an FRC robot while also being shown its mechanics. Inspired from this session, we recognized this needed to be expanded to other FRC teams.

About FRC, 4607 C.I.S

FRC, 4607 C.I.S is a student-run robotics team that strives to produce tomorrow's leaders by providing young adults with valuable engineering and business experience, act as a catalyst for a culture in which STEM concepts are widely celebrated, and build a solid foundation of opportunities for students upon which to build future success. We are a 10 year team located in Becker, MN, a small town with slightly under 5,000 community members who support us.

About Coding for Cookies

Initiative Description

Coding for Cookies provides an outlet for Girl Scout troops to learn about STEM and Robotics. FRC teams are provided the resources and instructions to host local troops in their shops. Because Girl Scout troops often do not have the resources to earn a Robotics badge, Coding for Cookies sessions are very impactful.

The Goal

As of 2022, only 24% (Women in STEM Statistics) of the STEM workforce is made up of women, and we want to change that. Our ultimate goal is to introduce STEM and establish a familiarization of Robotics to young women and offer them hands-on engagement.

About This Guide

This handbook provides instructions for FRC teams to successfully host a Coding for Cookies session. These sessions are applicable for K-12 Girl Scouts, and this guide highlights the different badge names and requirements, which will depend on their age (for instance, Kindergarteners and 1st Graders would fall under the “Daisy Badge” requirements). This also explains our portable robotics kit which we are lending to other FRC teams with materials to easily host a Coding for Cookies session.

Daisy Badge

Kindergarten and 1st Grade

Badge 1- What Robots Do:

Step 1: Assess the group's prior knowledge of Robotics

Step 2: Explain what FRC is and how your Robotics team operates briefly.

Step 3: If the group is large enough, split them into smaller groups where they can be taught about FLL in a less intimidating group size.

Transition to a space where the FLL mats are set up and prepared with the FLL robots that are ready to be coded with EV3 Classroom (refer to the "Necessities" section).

Step 4: Explain each important part of an FLL robot. This includes the brick, motors, sensors, and power sources.

Step 5: Show them how to code the FLL robots to move in a straight line. Emphasize teaching them rather than having them code it on their own.

Transition to a space with an FRC robot. Ensure to hand out safety glasses to the girls.

Step 6: Introduce them to an FRC Robot and explain the basic mechanics. Allow each girl to operate the robot by pressing a simple button.

Step 7: Ask if any of the girls have questions, and remind the troop leaders that you can provide the girls a connection to a *FIRST* team near them.

Badge 2- How Robots Move:

This is the only age where we provide the resources for a second badge because it has simple requirements. Because this second badge is very easy to achieve, it can be awarded during the same session.

Step 1: Show them how an FLL robot works. Teach the girls how to use EV3 Classroom and how to program the robot. Let the girls work together (in pairs or small groups) to program the robot to complete one or two of the simpler tasks on the FLL field.

Step 2: Ask if any of the girls have questions, and remind the troop leaders that you can provide any of the girls a connection to a *FIRST* team near them.

Brownie Badge

2nd and 3rd Grade

Badge 1- Programming Robots:

Step 1: Assess the group's prior knowledge of Robotics

Step 2: Explain what FRC is and how your Robotics team operates.

Transition to a space where the FLL mats are set up and prepared with the FLL robots that are ready to be coded with EV3 Classroom (refer to the "Necessities" section).

Step 3: Explain each important part of an FLL robot. This includes the brick, motors, sensors, and power sources.

Step 4: Introduce them to EV3 Classroom and explain the basics of how to use it.

Step 5: Allow any of the girls to make an attempt in completing a very simple task. This could include turning the robot, or driving it in a straight line. Be prepared to assist them in any ways they need, including guiding them through and allowing them to watch.

Transition to a space with an FRC robot. Ensure to hand out safety glasses to the girls.

Step 6: Introduce them to an FRC Robot and explain the basic mechanics. Allow each girl to operate the robot by pressing a simple button.

Step 7: Ask if any of the girls have questions, and remind the troop leaders that you can provide any of the girls a connection to a *FIRST* team near them.

Junior Badge

4th and 5th Grade

Badge 1- Programming Robots:

Step 1: Assess the group's prior knowledge of Robotics

Step 2: Explain what FRC is and how your Robotics team operates *in detail*.

Transition to a space where FLL mats are set up and prepared with FLL robots that are ready to be coded with EV3 Classroom (refer to the "Necessities" section).

Step 3: Explain each important part of an FLL robot. This includes the brick, motors, sensors, and power sources.

Step 4: Introduce them to EV3 Classroom and explain the basics of how to use it.

Step 5: Let the girls work together (in pairs or small groups) to program the robot to complete one or two of the simpler tasks on the FLL field. Be prepared to *gently* guide them through the process and encourage attempts, even if they lead to failure.

Transition to a space with an FTC robot and an obstacle course. The obstacle course will be set up with spaced out cones to weave between. Considering the girls' age, this challenge could also be increased depending on if they are struggling.

Step 6: Show them how the FTC robot works and demonstrate how to drive it. Let each girl drive the robot on a simple obstacle course.

Transition to a space with an FRC robot. Ensure to hand out safety glasses to the girls.

Step 7: Introduce them to an FRC Robot and explain the basic mechanics. Allow each girl to operate the robot by pressing a simple button.

Step 8: Ask if any of the girls have questions, and remind the troop leaders that you can provide any of the girls a connection to a *FIRST* team near them.

Cadette Badge

6th, 7th, and 8th Grade

Badge 1- Programming Robots:

Step 1: Assess the group's prior knowledge of Robotics

Step 2: Explain what FRC is and how your Robotics team operates *in detail*.

Step 3: Show a video(s) that quickly demonstrates FTC, and/or what a completed robot looks like. Emphasize that hard work and effort will bring reward. Starting with this video is important as it will set the tone for this older group. Explain that FTC will come into play later on in the session.

Video recommendation: <https://youtu.be/abutHul8LDI>.

Transition to a space where the FLL mats are set up and prepared with FLL robots ready to be coded with EV3 Classroom (refer to the "Necessities" section).

Step 4: Explain each important part of an FLL robot. This includes the brick, motors, sensors, and power sources.

Step 5: Introduce them to EV3 Classroom and explain the basics of how to use it.

Step 6: Let the girls work together (in pairs or small groups) to program the robot to complete a few challenging tasks on the FLL mat. Be prepared to *gently* guide them through the process.

Step 7: Introduce them to a sensor on the robot. For example, you could show them a distance sensor, color sensor, or a touch sensor. Create a simple objective for them to follow and complete a task using the sensor. Be prepared to guide them through this.

Transition to a space with an FTC robot and an obstacle course. We recommend setting up spaced out cones to weave between. Considering the age group, this challenge could also be increased depending on if they are struggling.

Step 8: Show them how an FTC robot works in detail and demonstrate how to drive it. Let each girl drive the robot on a simple obstacle course.

Transition to a space with an FRC robot. Ensure to hand out safety glasses to the girls.

Step 9: Introduce them to an FRC Robot and explain the basic mechanics. Allow each girl to operate the robot by pressing a simple button.

Step 10: Ask if any of the girls have questions, and remind the troop leaders that you can provide any of the girls a connection to a *FIRST* team near them.

Senior Badge

9th and 10th Grade

Badge 1- Programming Robots:

Step 1: Assess the group's prior knowledge of Robotics

Step 2: Explain what FRC is and how your Robotics team operates *in detail*.

Step 3: Show a video(s) of a game reveal to give a visual of the competition and objectives.

**Video recommendation:*

<https://youtu.be/0zpflsYc4PA>.*

Step 4: Explain how an FLL robot is programmed using blocks (it isn't necessary to have an FLL robot present, explain the basics). Elaborate on how this is for younger students. Focus more on FTC and FRC for the rest of the session. Ensure to explain the most recent game.

Transition to a space with an FTC robot. Have a computer ready to be programmed via Java.

Step 5: Explain the parts of an FTC robot *in detail*.

Step 6: Introduce the girls to Java with an FTC robot and walk them through it, allowing them to type in simple things already pre-programmed. This would be autonomous.

Step 7: Test the autonomous to demonstrate that their efforts have taken a physical form.

Transition to a space with an FTC robot and an obstacle course. We recommend setting up spaced out cones to weave between. Considering the age group, this challenge could also be increased depending on if they are struggling.

Step 8: Hold a competition and time the girls in driving an FTC robot while taking turns.

Transition to a space with an FRC robot. Hand out safety glasses to the girls.

Step 9: Introduce them to an FRC Robot and explain the mechanics. Allow each girl to operate the robot by pressing a button. The challenge could be increased depending on if they are struggling.

Step 10: Ask if any of the girls have questions, and remind them along with troop leaders that you can provide any of the girls a connection to a *FIRST* team near them.

Ambassador Badge

11th and 12th Grade

Badge 1- Programming Robots:

Step 1: Assess the group's prior knowledge of Robotics

Step 2: Explain what FRC is and how your Robotics team operates *in detail*.

Step 3: Show a video(s) of a game reveal to give a visual of the competition and objectives.

**Video recommendation:*

<https://youtu.be/0zpflsYc4PA>*

Step 4: Explain what FLL, FTC, and FRC are.

Transition to a space with an FTC robot. Have a computer ready to be programmed via Java.

Step 5: Introduce them to an FTC robot and explain the parts and mechanics.

Step 6: Show them Java programming, as well as making an attempt to explain things in detail to them. Allow them to attempt coding while using Java after demonstrating for them. Ensure to be more hands off, but also offer assistance if they hit dead ends. This is a very crucial step, so it should be focused on.

Step 7: Explain how Java can translate into programming an FRC robot and how it would differ from programming an FTC robot.

Transition to a space with an FRC robot. Ensure to hand out safety glasses to the girls.

Step 8: Introduce them to an FRC robot and go into detail of each part and mechanic. This would include elaborating on things such as sensors, actuators, drivetrain, intake, etc. Attempt to point out more difficult concepts and teach them.

Step 9: Show them the drivers station and also explain this in detail.

Step 10: Allow each girl to operate the robot in pressing a button to shoot, for example. The challenge could be increased depending on if they are struggling.

Step 11: Ask if any of the girls have questions, and remind them that you can provide any of the girls a connection to a *FIRST* team near them.

Points to Cover

When working with unfamiliar individuals to *FIRST*, it is very easy to over complicate things. It is crucial to keep in mind that technical terms will often go misunderstood unless simplified. This is especially true when working with younger ages. Always be attentive to the ages you are working with and the language you are using. The questions listed below can be simply, or extensively answered:

- What is Robotics? - The branch of technology that deals with the design, construction, operation, and application of robots.
- What is *FIRST*? - *FIRST* Robotics Competition teams design, program, and build a robot starting with a standard kit of parts and common set of rules to play in a themed head-to-head challenge. Teams also build a brand, develop community partnerships for support, and work to promote STEM in their local community ("Home").
- What does a Robotics team do? - Under strict rules, limited time and resources, teams of students are challenged to raise funds, design a team "brand," hone teamwork skills, and build and program industrial-size robots to play a difficult field game against like-minded competitors. It's as close to real-world engineering as a student can get ("Home").
- What is programming? - The process of writing code to facilitate specific actions in a computer, application or software program, and instructs them on how to perform (Cote).
- Why is knowledge of programming helpful even outside of computer science? - Understanding how programming works means understanding how a large part of the world works; many tools in our world have their own code. On top of that, learning to program teaches troubleshooting. This can help you with any issue you might encounter with an electronic.
- What are computer languages? - Computer languages are what code is composed of. Usually languages create a way to make 1's and 0's easier for people to understand. There are a wide variety of computer languages, but one of the most popular is Java.
- Why are these sessions helpful? - Coding for Cookies sessions will offer Girl Scouts an introduction into basic programming. Exposure to STEM, especially with attentive and hands-on teachers, permits students to ask questions, engage, and work with experienced Robotics students for free. For some, this may be their transition into a love for STEM.

Portable Robotics Kits

After receiving a generous grant from the Intuitive Foundation, we are investing \$7,150 into Coding for Cookies. To ensure other FRC teams can easily host Girl Scouts in their facilities, 4607 is offering to borrow our portable robotics kits to other FRC teams.

Included Materials

These kits include the following:

- 2 EV3 FLL robots
- 2 EV3 robot chargers
- 1 Customized FLL mat
- 2 FTC robots and their controllers
- 2 labeled Drivers Hubs for the FTC robots
- 2 Drivers Hub chargers
- 1 Chromebook laptop with EV3 Classroom downloaded
- 1 Chromebook charger
- 10 Cones red and blue cones (for FTC robot obstacle course)
- 1 Binder with written and recorded instructions on using materials from the portable robotics kit accessible through the binder and QR codes

Not Included Materials

Things not included, but required to host a session, are the following:

- Safety glasses
- An FRC robot to demonstrate for the Girl Scouts
- An FRC drivers station



2023 Portable Robotics Kit

Even if your team has all of the resources to host a session, this kit allows you to have convenient access to all of the materials you need. If your team is interested in using our portable robotics kit, please contact us at codingforcookies4607@gmail.com.

Necessities

If you do not plan on using our portable robotics kit, you can still host a Coding for Cookies session. Depending on how many girls are being hosted in one session, the amount of items needed will vary. Below are listed some general recommendations of what to prepare for. Note that different age groups will require different things.

1-6 Girls:

- Have EV3 Classroom Downloaded on each laptop for the coding program (<https://education.lego.com/en-us/downloads/mindstorms-ev3/software>) (K-8)
- 1-6 Pairs of safety glasses (K-12)
- 1 FLL robot ready to be coded via blocks (K-8)
- 1 Laptop to code the robot with either Blocks or Java depending on the age (K-12)
- 1 FLL mat (K-8)
- 1 FTC robot (it must be drivable for K-10, and must be prepared to be coded via Java for 9-12)
- 1 controller for initializing the FTC robot to drive (K-10)
- 3-5 Cones to create an obstacle course for driving the FTC robot (K-10)
- Have a space ready to play a video for the girls (6-8)
- 1 Operable FRC robot (K-12)
- 1 Drivers station for operating and driving the FRC robot (K-12)
- 2-3 Instructors
- Leave 2 Hours for each session which can be organized with Troop Leaders

7-14 Girls:

- Have EV3 Classroom Downloaded on each laptop for the coding program (<https://education.lego.com/en-us/downloads/mindstorms-ev3/software>) (K-8)
- 7-14 Pairs of safety glasses (K-12)
- 2 FLL robots ready to be coded via blocks (K-8)
- 2 Laptops to code the robots with either Blocks or Java depending on the age (K-12)
- 2 FLL mats (K-8)
- 1-2 FTC robots (they must be drivable for K-10, and must be prepared to be coded via Java for 9-12)
- 1-2 controller(s) for initializing the FTC robot(s) to drive (K-10)
- 3-10 Cones to create an obstacle course(s) for driving the FTC robot(s) (K-10)
- Have a space ready to play a video for the girls (6-8)
- 1 Operable FRC robot (K-12)
- 1 Drivers station for operating and driving the FRC robot (K-12)
- 4-6 Instructors
- Leave 2 hours for each session which can be organized with Troop Leaders

15-20 Girls

- Have EV3 Classroom Downloaded on each laptop for the coding program (<https://education.lego.com/en-us/downloads/mindstorms-ev3/software>) (K-8)
- 15-20 Pairs of safety glasses (K-12)
- 3 FLL robots ready to be coded via blocks (K-8)
- 3 Laptops to code the robots with either Blocks or Java depending on the age (K-12)
- 3 FLL mats (K-8)
- 2 FTC robots (they must be drivable for K-10, and must be prepared to be coded via Java for 9-12)
- 2 controllers to drive the FTC robots (K-10)
- 6-10 Cones to create obstacle courses for driving the FTC robots (K-10)
- Have a space ready to play a video for the girls (6-8)
- 1 Operable FRC robot (K-12)
- 1 Drivers station for operating and driving the FRC robot (K-12)
- 6-8 instructors
- Leave 2 hours for each session which can be organized with Troop Leaders

If your team does not have all of the necessities, please consider contacting us to borrow our portable robotics kit. Otherwise, you can rearrange to make it work for your team. For example, if getting 2 FTC robots isn't possible when in a large group, perhaps split the group into two and have them participate in different things at the same time. This way, one group can focus on the FTC robot, and the other can focus on the FRC robot.

Research

With little experience or knowledge on Girl Scouts, it can be challenging to know where to start. After developing somewhat of a plan, a great way of finding local Girl Scout troops is either by word of mouth, or online. We suggest using the following website:

<https://www.girlscouts.org/en/get-involved/become-a-girl-scout/join-a-troop.html>

This locator asks for simple questions regarding your location. After filling this in, you can begin to reach out and organize a date with troops!

Where to Begin

The following are steps that should be taken in order to have success with a session:

Step 1: Ensure your group has the resources and individuals to carry out Coding for Cookies. Discuss with your team.

Step 2: Locate Girl Scout Troops near you and reach out to a Troop Leader. Ensure to ask about their ages, availability, and prior knowledge about Robotics. This gauges which set of instructions you should follow with the group (for example, if they are 4th graders, you will follow the instructions for the Junior Badge).

Step 3: Prepare the setup beforehand, including to have the proper programs downloaded on the computers for coding. Familiarize your instructors with these programs if they are not already. If possible, do a test run with all the pieces to avoid troubles during the session.

Step 4: Host the girls in your shop/space on an organized date in correspondence with the Girl Scout Troop.

Step 5: Please send us photos of your team working with Girl Scout Troops to: codingforcookies4607@gmail.com.

Any questions can be directed to: codingforcookies4607@gmail.com

Works Cited

Cote, Joe. "What Is Computer Programming? How to Become a Computer Programmer?"

Southern New Hampshire University, 6 Sep. 2022,

<https://www.snhu.edu/about-us/newsroom/stem/what-is-computer-programming>

.

"Home." *FIRST*, For Inspiration and Recognition of Science and Technology (FIRST),

<https://www.firstinspires.org/>.

"Women in STEM Statistics." *Women in STEM Statistics*, 3 Nov. 2022,

<https://www.stemwomen.com/women-in-stem-percentages-of-women-in-stem-statistics>.